Why An Airplane Flies

Activity Objectives

- To review the concepts of Lift, Thrust, Drag, and Gravity in relationship to flight
- To review and demonstrate Bernoulli's Principle

Materials

- ✓ Paper
- ✓ Pencils
- ✓ Study sheet

Background

There are many ways to demonstrate Bernoulli's principle. Several ways are shared in this activity.

Instructions

Procedure A

1. Have the students tape a piece of paper to the side of a pencil.
2. Hold the pencil sideways in two hands and blow gently across the top of the paper.
3. Observe the action of the paper.

Procedure B

1. Place the edge of a piece of paper between the pages of a book.
2. Hold the book at an angle and blow gently across the edge of the book with the paper in it.
3. Observe the paper.

Procedure C

1. Attach the hose of a vacuum cleaner to the "blow" connection.

2. Hold the hose straight up and turn the vacuum on.

3. Place a ping pong ball in the stream of air blowing out of the hose.

4. Observe the action of the ball.

NOTE: In all cases, the paper should rise and the ball should “fly” in the stream of air. The movement of air over the curved surface of the paper (airfoil) creates a low pressure area above the “wing” and allows the higher pressure air below the paper to “lift” it.

Bernoulli’s principle states that a fluid-like air exerts less pressure when it is moving quickly than when it is moving slowly. Actually, an increase in the velocity of a fluid is always accompanied by a decrease in the pressure exerted by that fluid. The lift created by the movement of air over a wing must be enough to support the weight of a plane and its contents for the plane to fly.

Another force acting against a plane is drag. Drag is created by the resistance of the air to the movement of a plane through the air. Usually, the sleeker the design, the less drag is created. The force used to counteract drag is thrust. Thrust is created by the motor or engine in a powered plane.

Extension

Have the students research Bernoulli and learn more about the experiments he did which led to the description of the principle bearing his name. Have the students explore ways to increase lift in a wing. Explore the effects that different shape wings have on lift.